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The Story of CHEESE

by

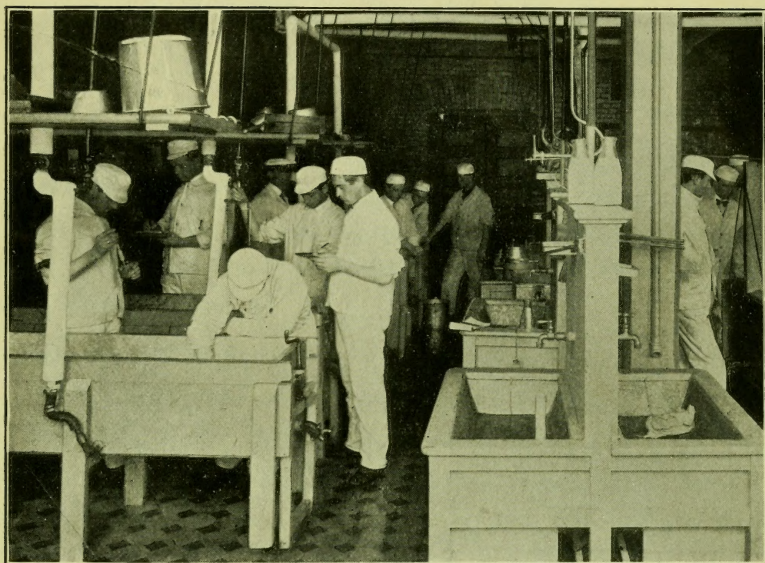
Johan D. Frederiksen







CHEESE



Students Making Cheese in the University Cheese Factory,
Madison, Wis.

A Short Treatise on the Manufacture of Various kinds of
Domestic and Foreign Cheese, Cheddar, Dutch,
Swiss, Italian, French, Limburger, Neuf-
chatel, Cream, Cottage Cheese, etc.

by

J. D. FREDERIKSEN

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INTRODUCTION

The following pages are from Chapter III of a book to be published shortly, entitled *THE STORY OF MILK*, a manual for the Domestic Science student and a guide for the Housewife and all who desire to know something about the handling and use of milk and its products.

The Story of Milk covers the following subjects:

I. The Production, Composition and Characteristics of Milk, Testing Milk, Milk Ferments, Pasteurization, etc.

II. Milk Supply and Creamery Products, Cream, Butter, Butter-milk, Ice Cream, etc.

III. Cheese and other Milk Products, Milk Sugar, Milk Powder, Condensed Milk, etc.

IV. Milk as a Food, Food Value, Milk for Infants and Growing Children, Milk Cookery including numerous recipes, etc.

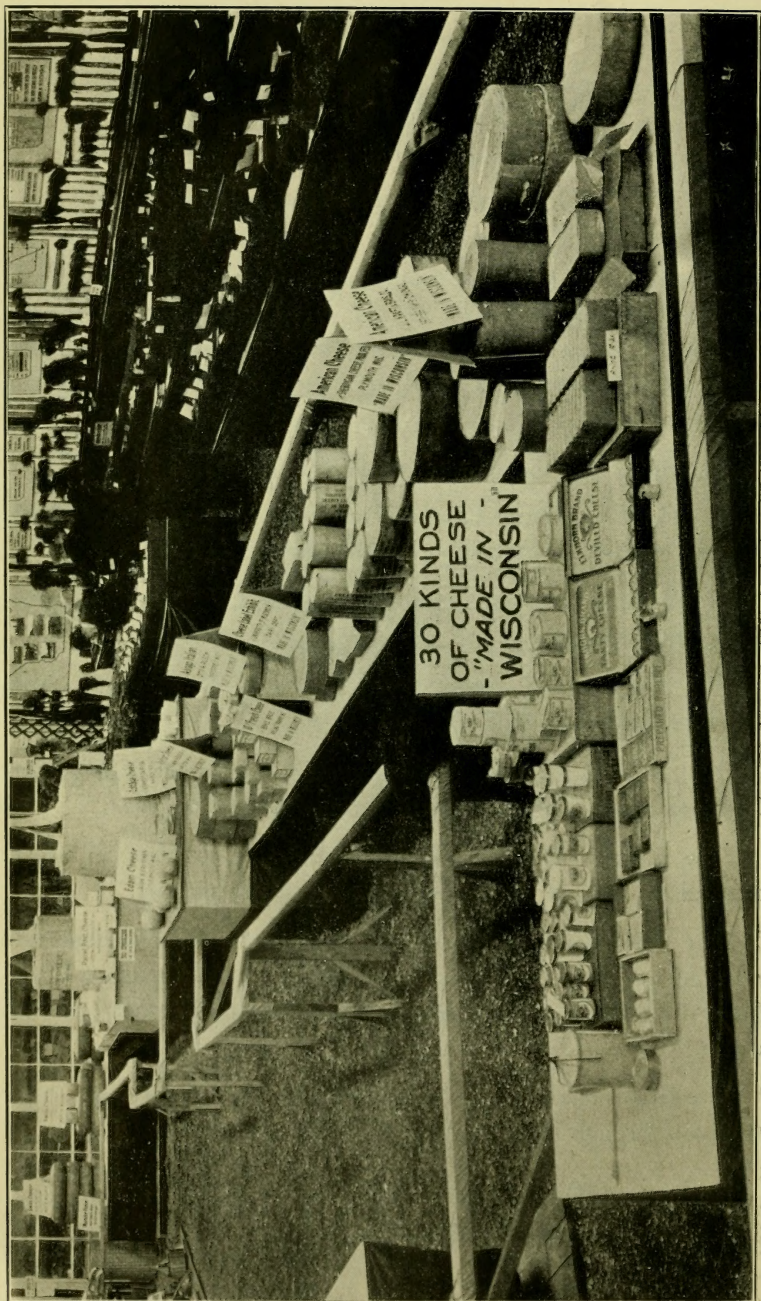
The present chapter is issued in advance to meet an urgent demand for a brief outline of the art of cheese making.

For more complete directions in cheese making students are referred to "*A B C in Cheese Making*" by J. H. MONRAD, Urner-Barry Co., No. 173 Chambers St., New York, and other technical works.

Readers interested in "*THE STORY OF MILK*" may order the book through book stores or from the publishers,

THE MOHAWK BOOK COMPANY,

Little Falls, N. Y.



CHEESE

Cheese of a thousand different kinds is made, varying in properties and appearance from the solid, yet mellow and agreeable Cheddar Cheese to the semi-soft, malodorous Limburger, the delicious, soft Neufchatel and Cream Cheese, or the sweet Myseost of Norway. In India cheese was made centuries ago; today it is produced the world over, in the caves of the Swiss Alps and in the most modern and scientific American cheese factories and laboratories. Of these myriad types we can here describe only a few.

Cheese may be classified into that made with rennet and that made without. Of cheese made with rennet some is what is called hard, some soft.

The English and American *Cheddar*—the common *American cheese*—the Dutch *Gouda* and *Edam*, the Swiss *Gruyere*, and the Italian *Parmesan* are all hard cheese made with rennet. As examples of the soft varieties may be mentioned the French *Camembert* and *Brie*, *Cream* and *Neufchatel* Cheese. In a class by themselves are such cheeses as the French *Roquefort*, the English *Stilton*, and the Italian *Gorgonzola*, their peculiar flavors being derived from molds implanted in the curd.

When cheese is made without rennet, the milk is allowed to curdle by natural acidity or it is in some other way made acid. Among the varieties made by this method the common *Cottage* Cheese is the best known.

For many years imitations of foreign varieties such as Swiss and Limburger have been made in Northern New York and Wisconsin. As a result of the war and the cutting off of foreign cheese imports, the State of Wisconsin has built up a large business in these fancy varieties. New types have lately been added, as the *Romano*,

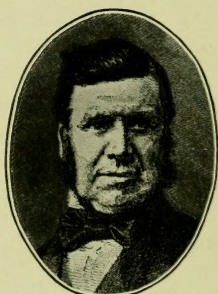
Riggiano, and *Myzethra*, which are of Italian and Greek origin. Some of these are made of whole milk, some of partly skimmed milk, and others of the albumin of the whey.

Let us briefly review the characteristic features in the making of the older types.

CHEDDAR CHEESE

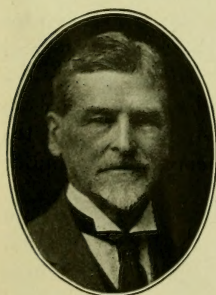
For a hundred years or more this famous cheese has been made and marketed at the village of Cheddar near Bristol, England.

In the middle of the nineteenth century a farmer in that neighborhood, Joseph Harding of Marksbury Vale, systematized the manufacture and it was his method that became the model for cheese-making in America. In this country it was first made in Herkimer County, N. Y., where Harry Burrell not only made cheese for the home market, but also exported to England, and his son, David H. Burrell, at Little Falls later developed the machinery which became the standard for the American and Canadian cheese factories.



JOSEPH HARDING

Who systematized the making of Cheddar Cheese in England

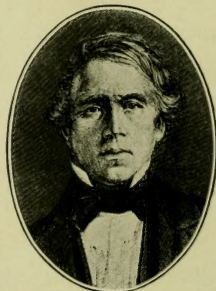


DAVID H. BURRELL

Who introduced labor-saving machinery and supplies in the Cheese Factories

ly supplies England with Cheddar Cheese of excellent quality.

The factory system by which cheese was made from milk brought together from several farms, originated near Rome, N. Y., and soon cheesemaking became an important industry throughout Central and Northern New York whence it spread into Pennsylvania, Ohio and the West, as well as to Canada. Today Wisconsin makes more cheese than all the other states together and Canada large-



JESSE WILLIAMS

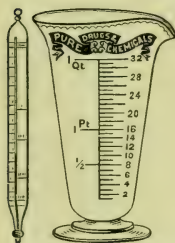
Father of the American Factory System

AMERICAN CHEDDAR CHEESE

The Factory System

The milk is delivered in the morning by the farmers at the factory and is weighed and strained through cheese-cloth into the cheese vat. When it is all in the vat it is warmed to a temperature of 86° F. by letting steam into the water surrounding the bottom and sides of the jacketed vat.

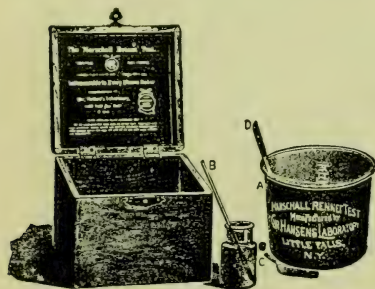
Ripening. The milk should be slightly acid, not noticeably sour, yet sufficiently ripened for the proper fermentation to take place in the process that follows. The best cheese makers regulate the ripening by adding a starter to the sweet milk and allowing the lactic acid bacteria to multiply in the milk until a "Rennet Test" or "Acid Test"* shows that the desired degree of acidity has been reached. The starter may be sour whey or preferably prepared from sweet skim milk or whole milk with a commercial lactic acid culture as described in Chapter I under *Ferments* and *Buttermilk*. From 1 to 2 per cent. starter is usually sufficient. An acidity of .18 to .20% or 2½ degrees on the Rennet Test is usually desired before the rennet is added.



A Measuring Glass and an accurate thermometer are indispensable.

*THE MARSHALL RENNET TEST consists of a graduated cup (a) with a fine hole for an outlet in the bottom. One cubic centimeter of a standard rennet extract is diluted with water in the glass bottle (c). The cup is filled

with milk and placed on the corner of the cheese vat, the milk being allowed to run through the fine hole in the bottom of the cup. The moment the surface of the milk reaches the upper mark of the graduation in the cup the diluted rennet extract is added and quickly stirred into the milk with the spatula (d).



The Marshall Rennet Test

When the milk begins to curdle it stops running out. The sweeter the milk is the more will run out before coagulation stops it and the mark on the scale at which it stops indicates the degree of acidity or ripening. The point is to have the milk alike every day and if, for instance, the cheese maker has found that his cheese is best if he adds the rennet to the milk in the vat when the test shows 2½, he wants to ripen the milk to that degree every day. So, if the test shows 3 or 4, it indicates that the milk is not sufficiently ripened and it should be allowed to stand warm for a longer time before it is set with rennet.

THE ACIDOMETER for making an Acid Test is described in Chapter I.

Adding Color and Rennet.* If the cheese is to be colored, from 1 to 2 ounces of liquid cheese color (Annatto dissolved in an alkali) per 1000 lbs. of milk is now added and thoroughly mixed into the milk which is then set with rennet. Three ounces of a standard rennet extract to 1000 lbs. of milk is usually sufficient. Enough should be used so that the milk will show beginning coagulation in 10 to 15 minutes and be ready to cut in 30 to 40 minutes.



CHRISTIAN D. A. HANSEN
Inventor of Commercial
Rennet Extract

The extract should be diluted with ten times as much water and is then poured into the milk under vigorous stirring so as to be thoroughly distributed and incorporated in the whole mass.

Owing to the scarcity of the raw material for rennet extract during the war, pepsin extracted from hogs' stomachs has been substituted in many factories and is used either in dry form or as a liquid extract instead of rennet extract.

***RENNET** (see under *Ferments* in Chapter I) is prepared from the third division of the stomach of the suckling or milk-fed calf. Fifty years ago cheese makers used to make their own rennet by soaking salted calves' stomachs in sour whey, and our grandmothers used a piece of a dry, salted stomach to make Junket or "Curds and Whey." About 1868, Christian Hansen, of Copenhagen, Denmark, began the preparation of Commercial Rennet Extract which soon supplanted the home-made rennet in all countries wherever cheese was made. Nowadays rennet in liquid or powder or tablet form for cheese-making, and Junket Tablets for milk puddings, are prepared pure and of known strength in laboratories and handled by druggists and dealers in dairy supplies.

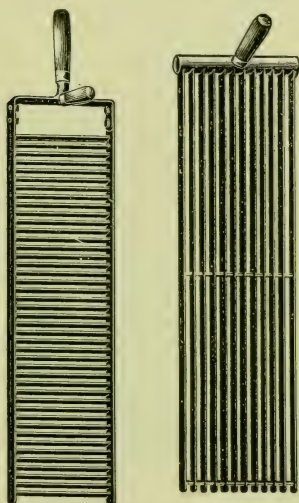
The fresh stomachs are saved by the farmers or butchers and are either blown up and dried in the air protected from sunlight and rain, or split lengthwise and spread out flat and salted on both sides.

In the laboratory the ferment is extracted by chemicals and a pure, clear liquid extract is prepared, of uniform strength and good keeping quality. Or the extract is condensed into a powder which again is compressed into tablets of great strength.



Blowing up the Rennets
to dry them

With pepsin as the coagulant it is necessary to ripen the milk somewhat further than if rennet is used, in fact to the danger-point where a little more acidity is apt to do harm and produce a dry and crumbly cheese and loss of butter-fat in the whey. Most cheese makers therefore prefer rennet when they can get it.



Curd Knives

The rennet having been added, the milk is left undisturbed until a firm curd has been formed. When the curd breaks or splits sharply before the finger pushed slowly through it, it is ready to be "cut."

Cutting. Two sets of curd knives are used, each consisting of a metal frame in which tinned steel blades are hung, in one vertically and in the other horizontally. The vertical knife is first carried slowly through the curd lengthwise and crosswise; the horizontal set of blades is then moved carefully through the length of the vat. When the cutting is over, the entire mass should be in cubes about half an inch square.

The whey that begins to separate out should be clear and yellow. Milky whey is a sign that the butterfat is escaping in it; the curd has been broken up too violently. In curdling, the casein encases the butter-fat and the object of the breaking up of the curd in the vat is to expel the whey but retain the fat in the cheese.

"Cooking" the Curd. Gentle heat is now applied to raise the temperature gradually to 98° or 100° in the course of about 30 minutes. Meanwhile the small pieces of curd are kept floating in the whey by gentle stirring with a rake and the hands, and are not allowed to pack at the bottom of the vat. The heating is easily

The ferment acts best when the milk is lukewarm, but it will do the work at temperatures ranging from 50°, or even lower, to 120° F. Strongly pasteurized or sterilized milk will not curdle with rennet, but milk pasteurized at a low temperature is not changed enough to prevent it from making a firm curd. More rennet does not make a firmer curd but causes the milk to curdle quicker; less rennet makes the process slower. Diluted milk will not curdle firmly, and the failure of milk to make a smooth coagulum of the usual consistency and in the usual time, the temperature being right and the regular amount of a standard rennet being used, is a never-failing proof that something is the matter with the milk. It has been changed from its natural condition by over-heating in pasteurization or by watering or doctoring, or it has not been properly ripened.

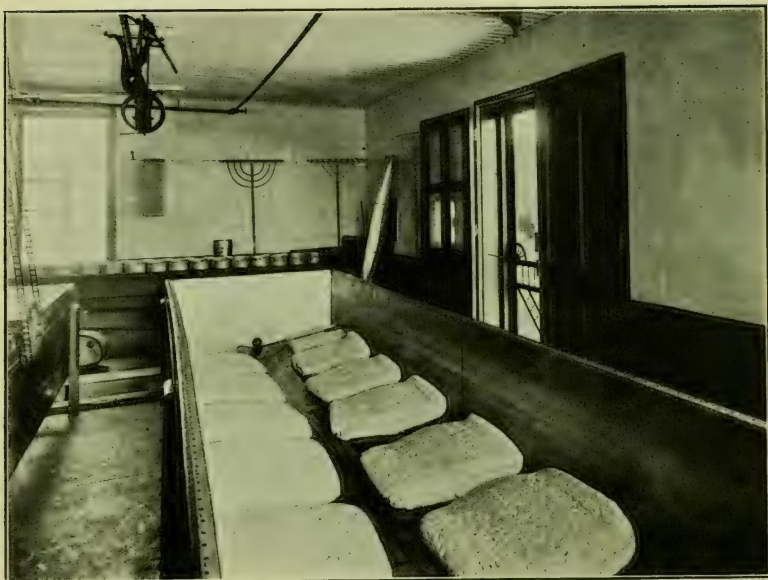
regulated by opening the steam valve little by little. Through the "cooking" the pieces of curd shrink to some extent and are hardened so that they will gradually stand livelier stirring without losing butter-fat. After the cooking the curd is left for an hour or so in the whey for a slight acidity to develop and it is then shoved toward the sides of the vat and the whey is drained off. Here again the "Acid Test" may assist in determining when the whey should be drawn.



Cutting the Curd

Cheddaring or Matting. After thorough draining, the curd is packed together in the bottom of the vat or on a "sink" provided with a false bottom covered with cheese-cloth. After fermenting for 10 or 15 minutes it is cut into large pieces which are again packed together for further matting. The exact condition to be attained can be determined only by experience.

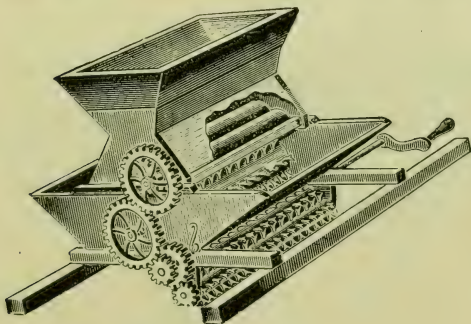
A simple test, the "Hot Iron Test," may, however, help the cheese maker to judge of this point. A handful of curd squeezed together and touched to a hot steam pipe or an iron rod heated almost red-hot in the fire under the boiler, and slowly withdrawn,



"Cheddaring" or "Matting" the Curd

will leave threads sticking to the iron. Depending upon the maturity of the curd, the threads will break at a length of from $\frac{1}{2}$ to 2 inches. Usually fermentation is considered sufficient when threads $1\frac{1}{2}$ inches long are formed by this test.

Salting. The matting is then interrupted by breaking up and salting the curd. This can be done by hand or by a curd-mill which cuts or breaks up the curd and permits a thorough mixing in of the salt. Two or three pounds of salt to one hundred pounds of curd, or the curd from 1,000 lbs. of milk, is the usual ratio.

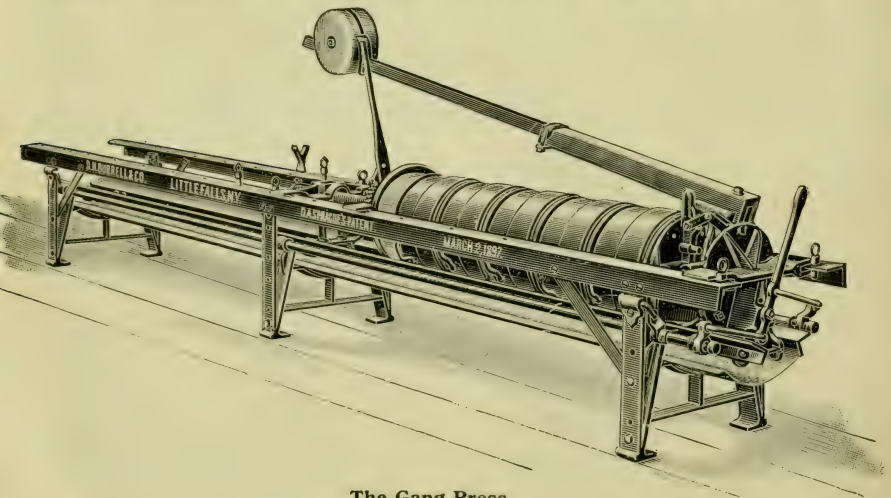


Curd Mill



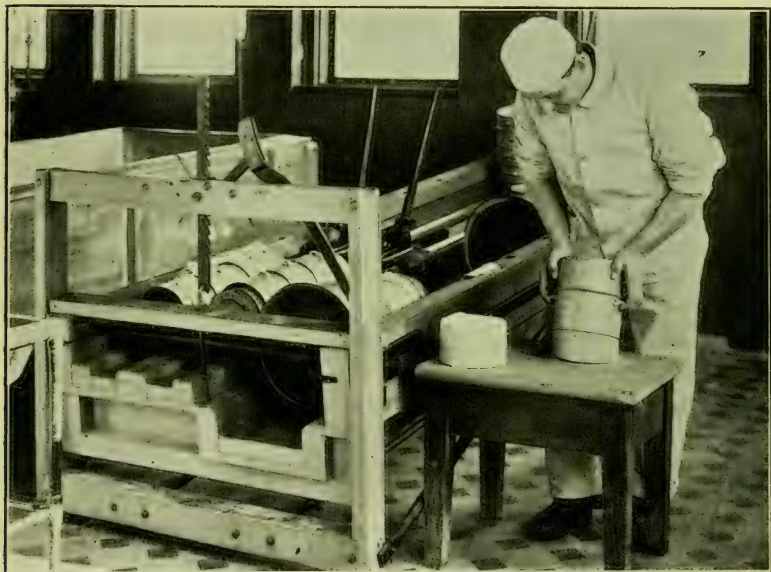
Filling the Curd into the Hoops

Pressing. Stirring and cooling the salted curd to about 80° F. makes it ready for packing into the hoops in which it is to be



The Gang Press

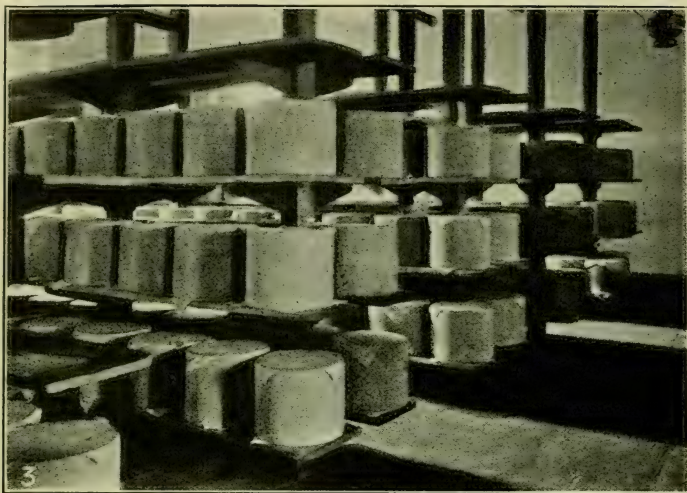
pressed. The hoop is usually a cylinder of heavy tin with a "follower" of wood on which the pressure is applied. Before the curd is put in, the hoop is lined with cheese cloth which remains on the cheese, when it is taken out. The press mostly used in the factory is the continuous pressure "gang-press" in which a number of cheese can be pressed at the same time.



Taking the Cheese out of the Hoops

Curing. After 18 hours' pressure the cheese is taken out of the press and out of the hoop, weighed and placed on a shelf or table in the curing room. For the first week or ten days it is kept at a temperature of about 70°, later the cheese is removed to a cooler room and possibly placed in cold storage. Usually it is paraffined to prevent too much drying and cracking of the rind.

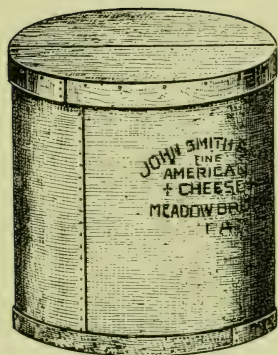
To cure a first class Cheddar Cheese takes from three to six months, but most of the American cheese is made to cure much more quickly and is eaten two to four months old. Indeed, it is generally shipped from the factory eight to ten days old and whatever further curing it gets is in the warehouse of the commission-man or in the grocery store.



Curing Room

Form, Size and Packing. The old style American cheese is cylindrical, about 14 inches in diameter, and varying in depth to weigh between 60 and 80 pounds. Various other forms are now often made, square and long or in fancy shapes, such as a ball or a pineapple. Aside from such freaks, which have never become very popular, other deviations from the large, standard, American Cheddar, are also made to a considerable extent. People who have visited the beautiful National Dairy Shows held in turn in Chicago, Springfield, Mass., and Columbus, O., the National Milk and Dairy Farm Expositions of New York City, the Ontario Provincial Fair held each year at Toronto, or the annual State Fairs in New York, Wisconsin, Michigan and other cheese making sections will have in mind first the prominent exhibits of the regular Cheddar, showing a uniformity in texture, form and taste that is really remarkable. But one will also admire the variety of other forms. There are the "*Flats*" or "*Twins*", packed two in a box and weighing together the same as one "*American*"; the "*Young Americas*" packed four in a box; the "*Longhorns*" of six to eight inches in diameter; others made like a loaf of bread and creased so that a pound or two may be cut off fairly accurately, etc. .

The *Giant Cheeses*, weighing five to six tons, occasionally exhibited and cut up at World Fairs and on similar occasions are, like the pineapple cheese, a curiosity rather than an industrial product.



Cheese Box

One of the best forms, in the writer's opinion, is the small 5-lb. cheese, proportioned exactly like the large American. This makes a suitable size for an average family, the members of which have learned to appreciate a good cheese. If it is made smaller, too much is lost in the rind; if larger it gets too old before it can be consumed by one family.

The larger cheeses are usually packed in neat, snug-fitting elm-wood boxes, with thin "Scale Boards" on the top and bottom of the cheese, the smaller ones in paraffined pressed pulp or pasteboard boxes.

Cleaning the Vats and Utensils. Like every other place where milk and its products are handled, the cheese factory must be kept scrupulously clean. Vats and utensils should be rinsed first with cold or lukewarm water or whey, then scrubbed with boiling hot water and if necessary with soda, soap, or washing powder. The surroundings should be kept neat and attractive, and the cheese maker must see that the transportation cans are kept clean by the farmers and the milk delivered in good condition.

Yield. The yield is around 10 per cent. of the milk. To make a pound of fresh cheese takes from nine to eleven pounds of milk. In curing, a part of the weight is lost by evaporation, but this loss is reduced to a minimum by paraffining.

Composition. The American cheese contains almost all the casein and the butter-fat of the milk, besides such portions of the milk-albumin, milk-sugar, and mineral matter as is held in the water or whey which is retained in the cheese. In round figures average American cheese contains equal parts of casein, butter-fat and water, 30 to 35 per cent. of each.

Qualities. A good Cheddar Cheese should be mellow, yet solid, without holes, and of an agreeable taste, neither sharp nor bitter. Cheese can be made of skim milk, but it is hardly palatable. In the fall of the year, when the average milk is rich in butter-fat, one or two per cent butter-fat may be taken from the milk and the

resulting partly-skimmed milk will still make a fairly good cheese, hardly distinguishable from full Cream Cheese. Under the laws of the State of New York it must, however, be marked "Skim Milk Cheese."

CHEESE MADE FROM PASTEURIZED MILK

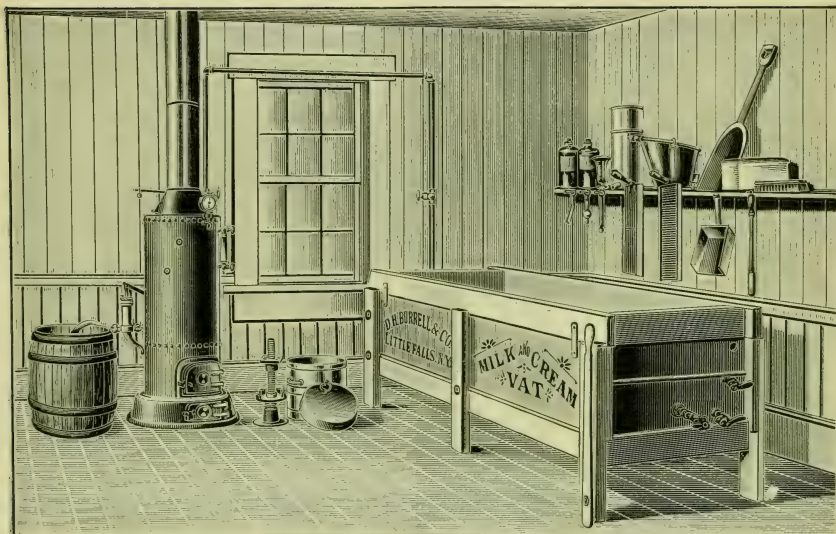
From time to time attempts have been made to make Cheddar Cheese from pasteurized milk. If the milk is heated to 145° only, and held for 30 minutes at such temperature, its property to form a firm curd with rennet is not destroyed and it will make a fine cheese, but if it is pasteurized at a higher temperature it will not curdle firmly until it is ripened or otherwise brought back to the condition required for satisfactory action of the rennet ferment. Thorough ripening with a pure culture starter will do it, or an addition of muriatic acid will accomplish the same in a shorter time, but care must be taken not to use too much, which would make the cheese dry and crumbly. Dr. J. L. Sammis and A. T. Bruhn of the Wisconsin Dairy School worked out the problem and systematized a process which is described in Bulletin 165 of the U. S. Department of Agriculture and by which it is claimed a first-class cheese can be made regularly from thoroughly pasteurized milk.

MAKING CHEDDAR CHEESE ON THE FARM

It takes quite a little experience to make a good Cheddar Cheese and, unless one has the time and opportunity to study it and make it an every-day practice, it is not as a rule advisable to attempt making Cheddar Cheese in the home from the milk of one or a few cows.

The amateur will usually find it easier to make Neufchatel or Cream or Cottage Cheese for home use or for the home market.

If Cheddar Cheese is to be made regularly it is best to get an outfit consisting of a small boiler and a jacketed vat, although cheese may be made in a plain wooden tub or any other convenient vessel. The double bottomed vat generally used in American as well as in Danish dairies facilitates both the heating of the milk before setting and the "cooking" of the curd in the whey after cutting. Either low pressure steam, or—better—water heated by steam, is introduced in the space between the outer, wooden bottom and the inner, tinned steel or copper bottom. If it is cool the milk should be warmed to 86° F.. In the summer it



American Outfit for Farm Cheese Making

may be warm enough as it comes in, fresh from the cow. If not, heat it by steam or by setting it in a "shot-gun" can in another vessel of hot water, stirring frequently, until the thermometer shows 86°. It may be well to add a little buttermilk or sour whey from the preceding day, or a pure culture starter made with Buttermilk Tablets, not to exceed 1 or 2 per cent.

If it is desired to make colored cheese add a teaspoonful of liquid cheese color, or $\frac{1}{2}$ cheese color tablet dissolved in warm water, to 100 pounds of milk, more or less according to season and the shade of color desired in the cheese.



Taking the Temperature of the Milk in a Shotgun Can

Next add the rennet. Where cheese is made from less than 500 lbs. of milk Rennet Tablets are handy, one tablet to 80 or 100 lbs. For less than 50 lbs. of milk, Junket Tablets may be used, one to a gallon. Dissolve the tablet, or tablets, or fraction of a tablet, as the case may be, in *cold* water and stir the solution well into the milk, making sure of thorough mixing. Let stand covered for half an hour until a firm curd is formed. Cut or break the curd very carefully with a big knife or spoon or home-made fork with wires across the prongs, imitating as far as possible the operation with curd knives in the factory.

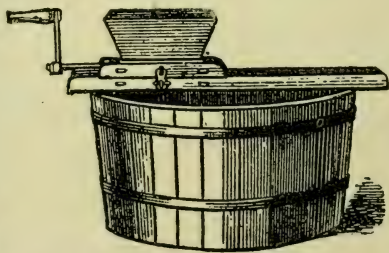


Curd Fork

“Cook” the curd as in factory cheese making. If steam is not available, allow the curd to settle and dip off some of the whey which is then heated and poured back on the curd so as to raise the temperature of the whole mass about 2 degrees. Repeat this several times, gradually raising the temperature to 100°, a few degrees at a time.

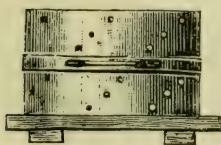
Keep the curd gently stirred up and floating in the whey and do not allow it to lie on the bottom of the vat long enough to pack firmly together, stirring once in a while until by smell and taste (if not also by acid or hot iron tests) it appears to be sufficiently fermented for the whey to be drawn, a condition that can only be learned by experience. This will be about two or three hours from the time the rennet is added.

Draw the whey and press more out of the curd with the hands. Let the curd mat and break it up alternately several times; finally crumble and pulverize it and keep it stirred with the hands, adding salt at the rate of three to four ounces to the curd from 100 lbs. of milk and continuing the stirring until the curd is



Plain Wooden Vat and Curd Mill

cooled down to below 80°, when it should be packed into the hoop and put to press. This salting and cooling may take another hour. The hoop may be made of wood or heavy tin of any size desired, with a loose follower of wood. The sides and bottom should be perforated to allow the whey to escape. Or



Mold or “Hoop”

it may be a cylinder without top or bottom, placed on a corrugated piece of board. Line the hoop with cheese-cloth before putting in the curd.

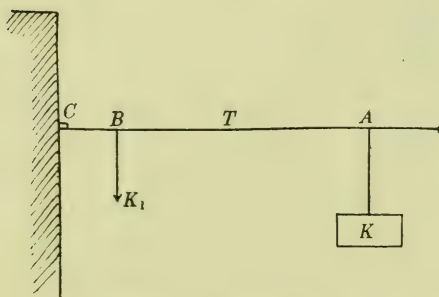
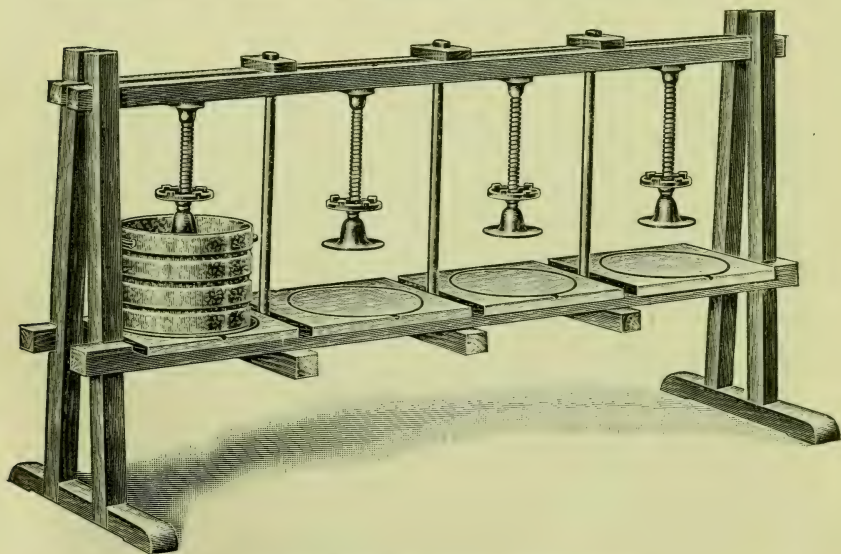


Diagram of Lever Press

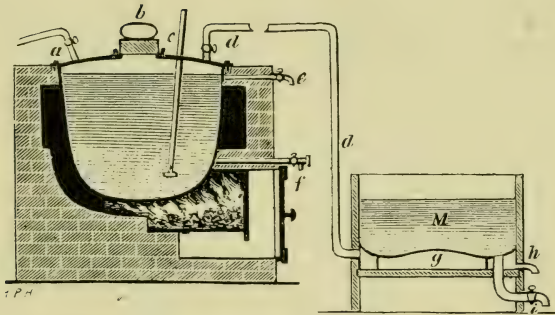
placed under the plank at the fulcrum (K_1) near the wall. If a compound lever-press or a screw-press is available it is better.

Pressing. A home-made lever-press, as outlined in the diagram, may be made of a plank or bar, one end of which (C), is stuck under a piece of a board nailed on the wall while at the other end a weight (K) is applied which may be moved in and out to regulate the pressure. The hoop is



Upright Factory and Dairy Cheese Press

It is important that the pressure is applied straight so as to make the cheese even and not one side lower than the other. Begin with light pressure and increase it gradually every hour until at night



Danish Kettle and Cheese Vat

the full pressure is applied. After one hour in press, take the cheese out and turn it in the hoop.

OTHER TYPES OF CHEESE MADE WITH RENNET

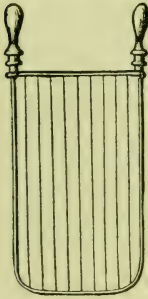
In the manufacture of the Dutch Gouda, the Danish Export, and other similar types, the cooking and matting of the curd, character-



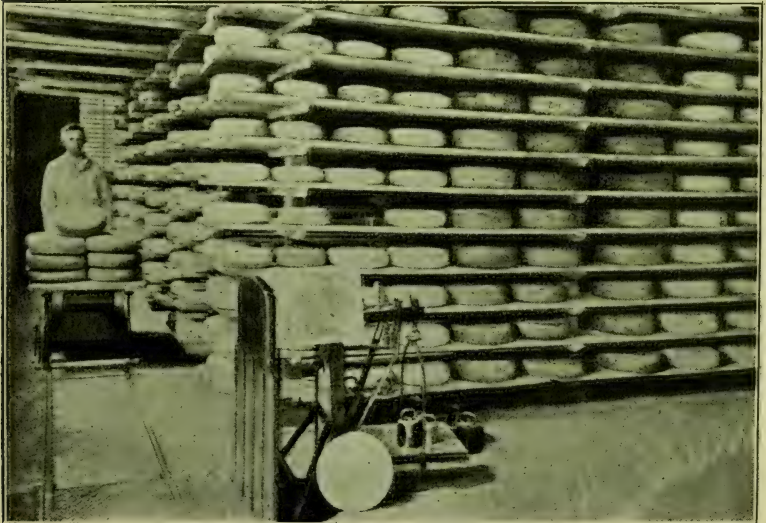
A Variety of Domestic and Foreign Cheese made at the Dairy School of the University of Wisconsin

istic of the English and American Cheddar, are more or less omitted. Otherwise the process and the result are not greatly different. They are all "hard" or solid cheese of the same class, though there are hundreds of varieties in different localities, each with some peculiarity of its own.

Gouda and Edam Cheese. The *Gouda*, like the *Danish Export* cheese, is made from whole or partly-skimmed milk which is set with rennet at 90° F. and is coagulated, ready for cutting, in fifteen to twenty minutes. The curd is broken with the "lyre," so-called, a frame on which piano wires are suspended. The curd is but slightly "cooked" and the whey is drawn while still sweet. After being pressed with the hands in the vat to squeeze out the whey the curd, still quite warm, is put into wooden molds and worked and squeezed in them with the hands for half an hour to eliminate more whey, when the mold is placed in a regular press for 12 to 18 hours. To salt it the cheese is placed

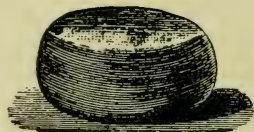


The Lyre

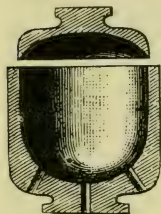


Curing Room in a Gouda Cheese Factory

in a strong brine where it remains for several days. It is then put on the shelf in the curing room where it is turned and rubbed daily and in four to six weeks it is marketed. The cheese is about 10 inches in diameter by 4 to 5 inches high.



Gouda Cheese

Mold for
Edam Cheese

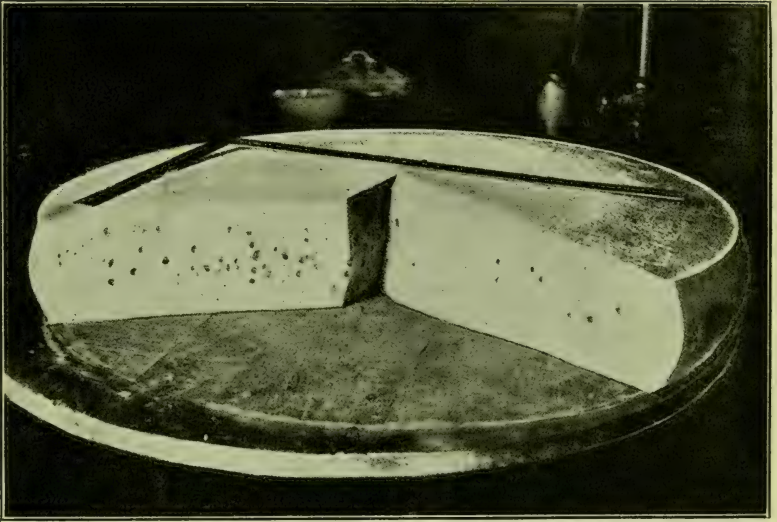
The ball-shaped, red *Edam* Cheese is also made in Holland by a similar method to that of the Gouda but the milk is set at a slightly lower temperature—about 86° F.—and a starter of sour whey is generally used.

Besides being colored in the usual way with *Annatto*, the outside of the Edam Cheese is painted with "*Turnsole*" a harmless vegetable coloring.

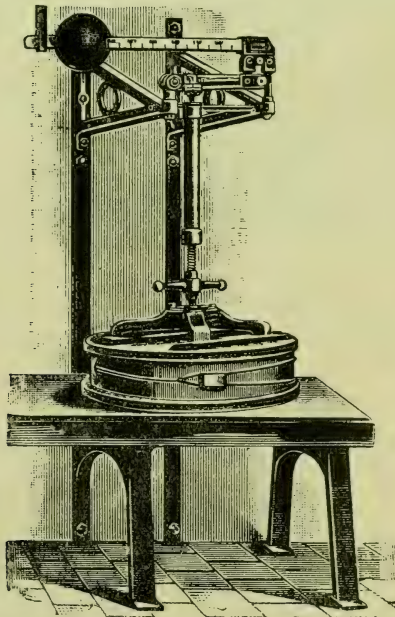
Swiss Cheese. The Swiss *Gruyere* or *Emmenthal* also belongs to this class. By special fermentation in the curd, gases are developed to produce the characteristic holes, which are wanted in the Swiss



In Swiss Cheese Making the Curd is lifted out of the Vat with a Strong Cloth



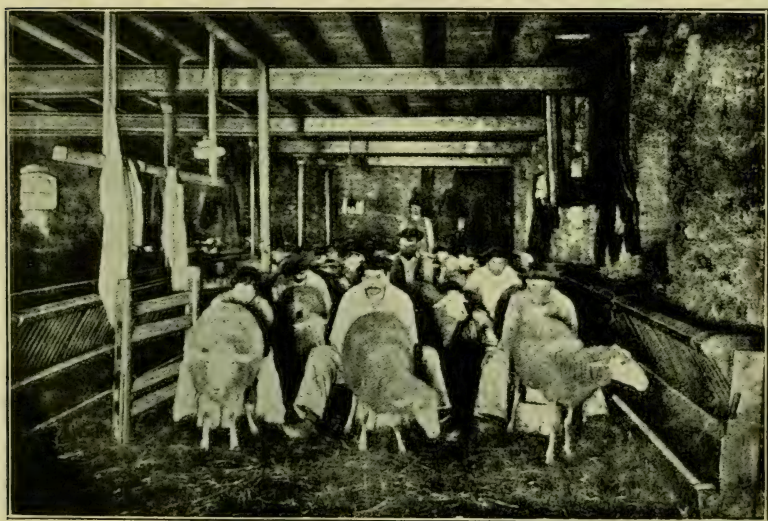
Swiss Cheese



Swiss Cheese Press

cheese but not tolerated in the American or Dutch cheese. Often the Swiss Cheese is made as large as a wagon-wheel and is subjected to long time curing, sometimes for years. It was long supposed that first-class Swiss Cheese could only be made in the Alps. But a very good imitation is now made in Northern New York and Wisconsin.

Roquefort. The French *Roquefort* is inoculated with a mold from stale bread which spreads through the cheese and produces the peculiar flavor of this type. It is made from sheep's milk and



Milking the Ewes at Roquefort, France

was formerly cured in cool subterranean caverns, but now in elaborate curing houses. In this country imitation Roquefort is made of cow's milk and cured in cold storage.

Parmesan Cheese is an Italian cheese made mostly in the Valley of the River Po and named from the City of Parma. It is produced from partly-skimmed milk and is allowed to become hard and dry, being used grated with macaroni.

The milk is set with rennet at a comparatively high temperature, about 95° F., and when it is firmly curdled it is broken up and stirred rather vigorously, which makes the curd fine and dry. Color is now added—powdered *Saffron*—at the rate of 0.5 gram to 100 kg.



Curing Room in a Roquefort Cheese Factory

milk. The curd is cooked slowly under constant stirring to a temperature up towards 140° when the whey should be perceptibly acid.

The curd is then allowed to settle in the round kettle and when fairly firm it is lifted up in a cloth, the same as in Swiss cheese making. The mold is also much the same as the Swiss and the curd is but slightly pressed. In the course of the day the cheese is turned once or twice and put into fresh cloth. The next day it is put into the curing room when it is rubbed with salt. In a few months the cheese is cured and is then scraped and polished with linseed oil. Sometimes it is kept in storage two or three years in a dark room at a temperature of 63° F. The composition averages: 32% water, 21% fat, 41% nitrogenous matters and 6% ash.

Caccio Cavallo is made in Southern Italy of a form almost like a beet root. The milk is set with rennet at about 95° F. and after

Caccio
Cavallo

the curd has been broken up the whey is dipped off and heated to boiling when it is poured back on the curd. The mass is then allowed to ferment eight to fourteen hours according to the temperature of the air. The quality of the cheese depends largely on this fermentation. The fermented curd is cut into pieces and submerged in boiling water and is then kneaded and formed into the desired shape.

After lying in cold water for two hours and in brine for thirty hours it is dried and smoked until it attains a fine golden color. It is made in various sizes, from 5 to 20 pounds, and the yield is said to vary from 10 to 16% of the milk. Caccio Cavallo is eaten on bread as well as with macaroni and is much relished by the Italians.

Limburger, Brick and other similar semi-soft cheese of the proverbial strong flavor originated respectively in Belgium and Bavaria, but are now largely made in Northern New York and Wisconsin as well.

The milk is set with rennet at a comparatively low temperature and the curd is cut while quite soft, care being taken, however, not to lose butter-fat. The curd is not salted in the vat but is dipped out into perforated wooden boxes or molds about 5 inches square and left to drain without pressure. The cheese are placed edge-ways like bricks on shelves and are rubbed with salt and turned every day until cured. During the curing process moisture exudes and a fermentation takes place which develops the well-known "Limburger" flavor. After eight or ten weeks the cheese is packed in paper and tinfoil and is ready for the market.

SOFT RENNET CHEESE

The soft cheese made with rennet may be classified as *fresh* and *cured*.

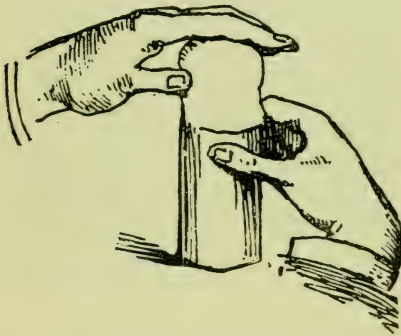
Neufchatel. The fresh soft cheese of the *Neufchatel* or *Cream Cheese* type is easily made and may be produced in any house from a small quantity of milk. The milk is set at a comparatively low temperature, usually 72° F., with very little rennet, just enough to coagulate the milk in about eighteen hours. During that time a slight acidity develops in the milk. When it is firmly curdled it is carefully dipped on to cheese-cloth suspended on a frame, or into cotton bags where it drains over night.

To make the cheese quickly a starter is sometimes used and more rennet employed. The milk is heated to 80° F., 25% starter and 7½ c. c. of rennet extract, or one rennet tablet per hundred pounds of milk, is added and the milk curdles in about 30 minutes.

After draining for a few hours the curd is gently pressed for a similar time. When the whey is fairly well expelled, the curd is kneaded or run through a meat cutter with a little salt, not more

than $2\frac{1}{2}$ oz. to 10 lbs. of curd. The outfit and the manipulation is essentially the same as described under Cottage Cheese.

A superior quality is obtained by pasteurizing the milk and if that is done a pure culture starter should always be used. If the slow setting method is used a very small amount of starter, say $\frac{1}{2}\%$, is sufficient but when the quick process is employed 10 or 25% may be added.



Molding Neufchatel Cheese

To give it a good appearance for market, the cheese is molded in little tin molds very much like a quarter-pound baking powder can with open ends. The cylindrical roll of cheese is wrapped in parchment paper and tinfoil and is immediately ready for consumption. In an ice box it will keep for a week or so. Neufchatel cheese may be made from whole milk or

partly-skimmed milk. The yield is from 16 to 20 lbs. out of 100 lbs of milk.

Cream Cheese is usually made in the same way. A mixture of cream and milk containing about 10% butter-fat is used, though sometimes the cream is not added until the time of salting. The mold is square, $2\frac{1}{2}$ " x $1\frac{1}{2}$ " x 2" deep. These soft kinds of cheese are often mixed with chopped peppers, olives or nuts and make excellent sandwiches.

Cured Soft Cheese. For *Cream* or *Neufchatel* Cheese, made for curing, the curd is salted more than for fresh cheese, or the molded cheese is rolled in salt. For a week or two it is placed in a curing room on straw mats or the like where it ferments slightly before being wrapped and packed for shipment.

French Soft Cheese. The many forms of French soft cheese as represented by the *Brie*, the *Camembert*, etc., are subjected to special fermentations which give to each its peculiar flavor. Attempts have

been made to use pure cultures of the bacteria active in such fermentations and so reduce the art of cheese making to a more scientific process. But it has been found that any desired kind of cheese cannot be made simply by adding a culture of this or that bacterium to pasteurized milk. Of vastly greater importance for the development of the proper bacteria is the handling of the milk and the curd by the experienced cheese maker. Inoculation with a pure culture alone does not make the special cheese wanted.



Camembert Cheese Factory

CHEESE MADE WITHOUT RENNET

Cottage Cheese. Of the sour milk types the common *Cottage Cheese* is the best known. It is made from skim milk which in a

warm room will curdle when sour, whether rennet and a starter are used or not. The thick sour milk is heated to anywhere between 100° and 120° and dipped into bags of cheese-cloth hung up for draining. The next day light pressure is applied for 12 to 24 hours, when the curd is kneaded, slightly salted, formed into balls and wrapped in parchment paper or packed into jars. For this purpose paraffined paper jars are very practical.



Mono-Service Jar

The more the curd is heated in the whey the drier will be the cheese. Often it is improved by allowing the curd to become rather dry and then working new milk or a little cream



Pouring the Curdled Milk on Cloth to Drain

into it, according to the use to which it is to be put—whether it is for bakers' stock or for the table.

Simple directions for making Cottage Cheese are given in Farmers' Bulletin 850 and A. I. 17 issued by the United States Department of Agriculture from which we reprint the following and copy the accompanying illustrations:

"One gallon of skim milk will make about $1\frac{1}{2}$ pounds of cheese. If the milk is sweet it should be placed in a pan and allowed to remain in a clean warm place at a temperature of about 75° F. until it clabbers. The clabbered milk should have a clean, sour flavor. Ordinarily this will take about 30 hours, but when it is desirable to hasten the process a small quantity of clean-flavored sour milk may be mixed with the sweet milk.

"As soon as the milk has thickened or firmly clabbered it should be cut into pieces 2 inches square, after which the curd should be stirred thoroughly with a spoon. Place the pan of broken curd in a vessel of hot water so as to raise the temperature to 100° F. Cook at that temperature for about 30 minutes, during which time

stir gently with a spoon for 1 minute at 5-minute intervals.

“At the conclusion of the heating, pour the curd and whey into a small cheese-cloth bag (a clean salt bag will do nicely) and hang the bag in a fruit-strainer rack to drain, or the curd may be poured into a colander or a strainer over which a piece of cheese-cloth has been laid. After 5 or 10 minutes work the curd toward the center with a spoon. Raising and lowering the ends of the cloth helps to make the whey drain faster. To complete the draining tie the end of the bag together and hang it up. Since there is some danger that the curd will become too dry, draining should stop when the whey ceases to flow in a steady stream.

“The curd is then emptied from the bag and worked with a spoon or a butter paddle until it becomes fine in grain, smooth, and of the consistency of mashed potatoes. Sour or sweet cream may be added to increase the smoothness and palatability and improve the flavor. Then the cheese is salted according to taste, about one teaspoonful to a pound of curd.

“Because of the ease with which the cheese can be made it is



Lifting the Cloth back and forth to facilitate draining

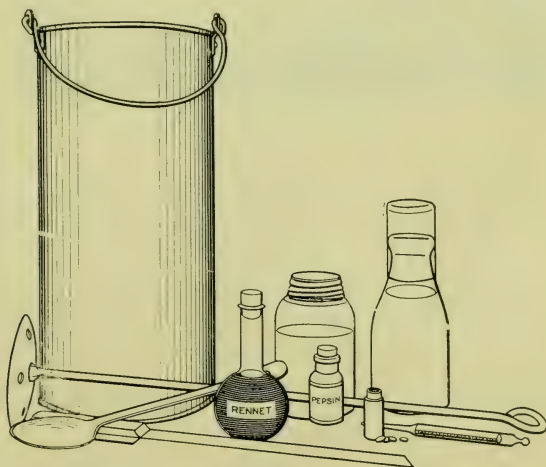
desirable to make it often so that it may be eaten fresh, although if it is kept cold it will not spoil for several days. If the cheese is not to be eaten promptly it should be stored in an earthenware or glass vessel rather than in one of tin or wood, and kept in a cold place."

Making Cottage Cheese with Rennet. In the bulletin mentioned a method is also given for making the cheese with rennet or pepsin. *Junket Tablets* make a convenient form of rennet to be used for this purpose.

The advantages claimed for this method are:

1. A finer textured and more uniform cheese.
2. The making requires less time and attention.
3. Losses of fat in the whey are reduced.

The process is the same as described above except that a solution of Junket Tablets is added to the milk at the rate of one tablet to 100 lbs. of milk. For less milk use a fraction of a tablet, or dissolve one tablet in ten tablespoonfuls of water and use one spoonful of the solution for each 10 lbs. of milk.

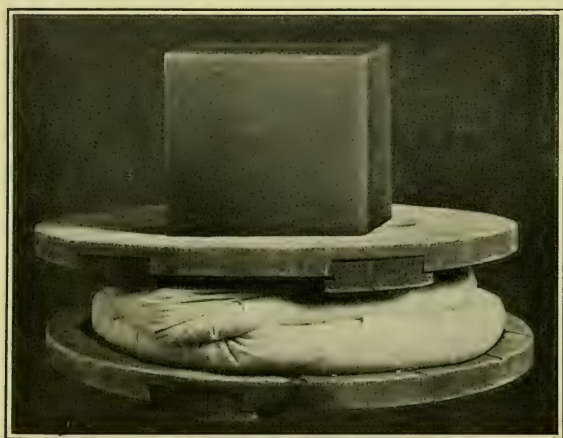


Apparatus Needed in Making Cottage Cheese

If a starter is used the rennet solution is added immediately after the starter is put in; if no starter is used the milk is left for five or six hours at 80° F. to ripen before adding the rennet. The milk will curdle over night.

After draining for thirty minutes on cotton sheeting the ends of the cloth are tied together and a weight is placed on top to press the curd gently until the desired consistency is attained.

Salt may be worked in at the rate of 2½ ounces to 10 lbs. of curd. If desired, add sweet or sour cream at the rate of ½ pint to 10 lbs. of curd or ¼ pint of cream to the product from 30 lbs. of milk.



Pressing the Curd

It will be seen that Cottage Cheese made with rennet is really the same as Neufchatel Cheese, the only difference being in the form and packing or wrapping of the finished cheese.

Snappy Cheese. By allowing the sour skim milk curd to ferment under careful regulation, a variety of sharp, snappy, more or less hard cheese can be made. Though there is no general demand for them, some kinds are quite popular in their own restricted localities. The Danish "*Appetite Cheese*" is only one of the many varieties which have as many names.

Club Cheese and similar varieties are made by grinding up old dry cheese with a little butter and packing the product in jars or

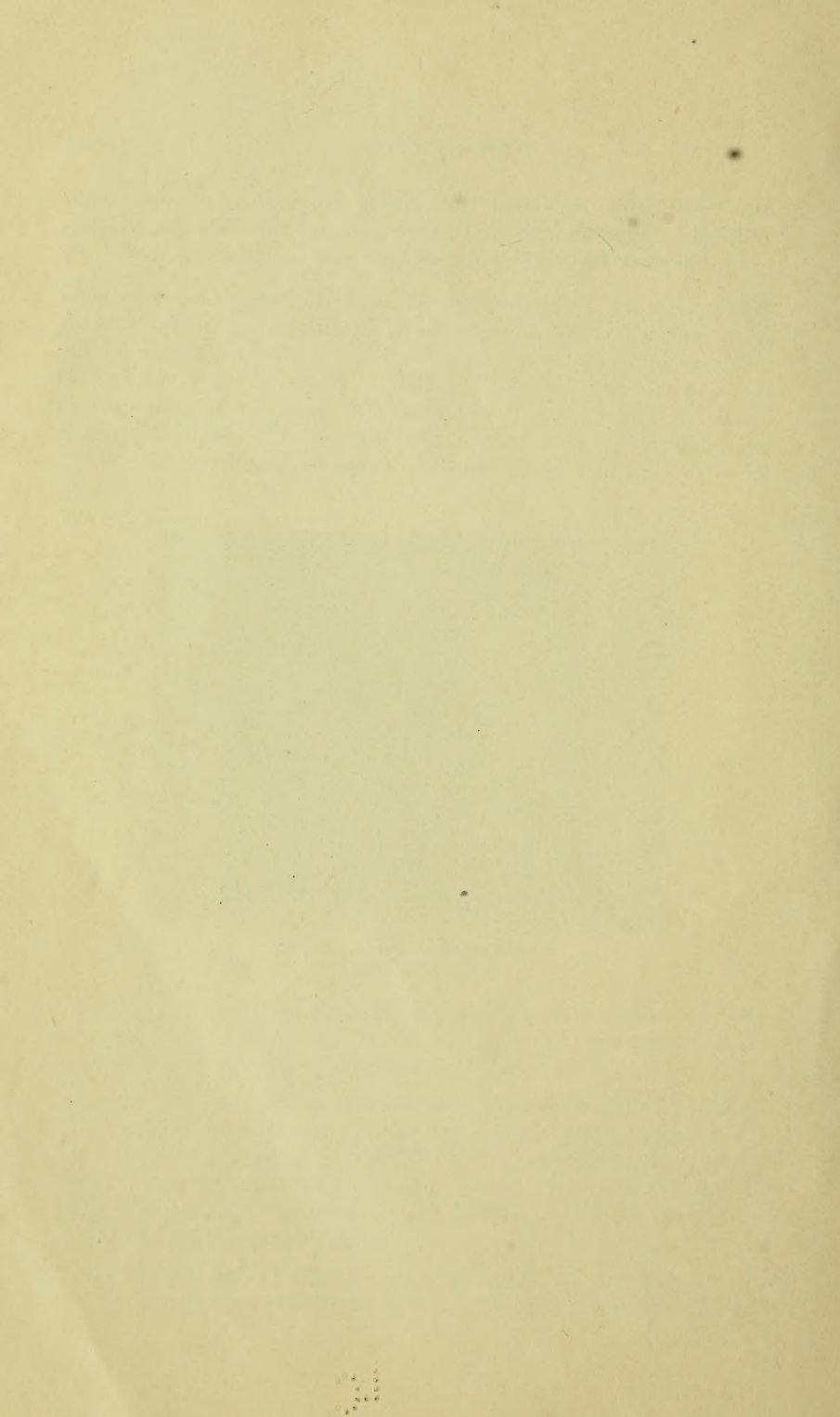
other attractive packages. American, Roquefort, or any other well-known type may be used as the stock for these cheeses. Everywhere they are favorites in dining cars and lunch rooms.

Whey Cheese. In Switzerland the so-called *Zieger Cheese* is made from sour whey, the albumin being coagulated by heat and, with whatever butterfat there may be left in the whey, skimmed off the top. In Norway "*Myseost*" ("*Ost*" is Norwegian for cheese) is made by boiling down whey almost to dryness. If goat milk is available to mix in, it improves the cheese. The main substance is sugar of milk and the cheese has a sweet, syrupy flavor.



Milking the Goat in Norway

END.





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